Meade® NG-Series and DS-2000 Digital Series™ Refracting and Reflecting Telescopes

The most important advancements in beginning and intermediate telescopes in 100 years.

Meade NG-Series and DS-2000 Digital Series telescopes bring the very latest in electromechanical design to the serious beginning or intermediate observer, providing extremely smooth motions in both altitude and azimuth. Basic Series concepts are as follows:

Models NG-60 and NGC-60: The Meade Model NG-60 60mm Refracting Telescope is an excellent choice as a "first telescope" for the beginning astronomer or for the casual observer of land or sky. Supplied complete with two eyepieces, a fine achromatic objective lens, fully-adjustable aluminum tripod, and the modern, highly functional Meade NG-Series altazimuth mounting, the NG-60 supersedes commonly available, lower-quality introductory telescopes.

Identical to the NG-60, but with a microprocessor incorporated into the telescope mounting, the NGC-60 allows for the automatic location of over 1400 celestial objects, simply by manually moving the telescope's optical tube, as directed by the telescope's computer display. In this way, hundreds of objects, including the major planets, star clusters, galaxies, and nebulae, which might otherwise be difficult to locate may be readily centered in the telescope's field of view. At a moderate pricing level the NGC-60 permits the unitiated observer the best possible opportunity to find and observe the entire range of celestial phenomena.

DS-2000 Series: With fully integrated Autostar motorized control systems Meade DS-2000 Digital Series models enable the automatic location of over 1500 celestial objects, simply by depressing the Autostar GO TO pushbutton. Oversize bearings on both telescope axes of all models negate the imprecisions found almost universally on competing models, and the larger light-collecting apertures

of the telescopes yield brighter, better-resolved images on all observed objects.

#494 Autostar Computer Controller: Identical in operating characteristics to the Autostar controller available for the Meade ETX-70AT telescope *(p. 4),* Autostar for DS-2000 telescopes is easy to use, even for the beginner who has never before operated a telescope.

Select a celestial object from the Autostar database, or, alternately, input the Right Ascension and Declination of *any* object in the sky to the Autostar display. In either case when the observer presses GO TO, the telescope automatically moves to the object at 4.5°/sec. on both telescope axes and places the object in the telescopic field of view. Autostar's database for DS-2000 telescopes includes the same listing as previously described in this catalog for the Model ETX-70AT *(see p. 5).* Additional Autostar capabilities include:

Automatic GO TO capability to any astronomical object of known coordinates (RA and Dec.). Enter an object's coordinates to the Autostar display, press GO TO, and Autostar moves the telescope to locate the object and place it in the telescopic field.

Precise sidereal-rate tracking. Once Autostar locates an object, it directs the telescope to track the object automatically on both telescope axes, simultaneously, keeping the object centered in the field.

9-Speed Dual-Axis Operation. Use Autostar's pushbuttons to move the telescope on either or both axes, simultaneously, at any of nine drive speeds, from very slow 2x sidereal to fast 4.5°/second.

The #494 Autostar Controller is included as standard-equipment with DS-2000 models.

For the beginning or intermediate observer Autostar is a revelation that permits the observation of hundreds of objects the very first night out. And, with its wide-ranging capabilities, Autostar is a valuable tool in the hands of the most experienced observer as well.

Observing with Meade NG-Series and DS-2000 Series Telescopes: A large and exciting array of objects is visible through any of the Meade telescopes described here: the rings of Saturn, including, in 114mm and larger models, the Cassini Division in the rings; Saturn's largest satellite, Titan; the four largest satellites of Jupiter, as well as cloud belts across the planet's disc; Moon craters, mountain ranges, and fault lines by the hundred; and hundreds of deep-space phenomena: galaxies, nebulae, star clusters.

"The DS [Digital Series] telescopes stand alone in today's market. They are remarkable."

"The main optics in both [the 70mm and 114mm] telescopes proved to be very good, delivering the performance that I would expect of their respective designs…Star images were clean and tight and came to a crisp focus in the 25- and 9-mm eyepieces supplied with the scope. Lunar views were also crisp and contrasty…Colorful double stars like Albireo in Cygnus and Gamma Andromedae were impressive sights in the [70mm] refractor, as were a surprising number of deep sky objects…Autostar's pointing accuracy with the DS scopes was indeed superb…Every object that I asked the [70mm] scope to slew to ended up in the field, often within the central half…I was amazed at how much I could see…You have to accept [Meade Digital Series telescopes] as fantastic dollar values…The DS telescopes stand alone in today's market. They are remarkable."

— from the review in *Sky & Telescope*, September, 1999

The Orion Nebula (M42), for example, is easily visible in all NG-Series and DS-2000 Series telescopes; in the NG-60 the nebula's four central stars are readily resolved and a good deal of tenuous nebular structure can be observed. Through the larger aperture of the DS-2114ATS, however, the nebula becomes almost three times brighter at the same magnification, filling the field of view at moderate powers and with outer extensions of the gas cloud now observable. The Pleiades (M45), an open star cluster in the

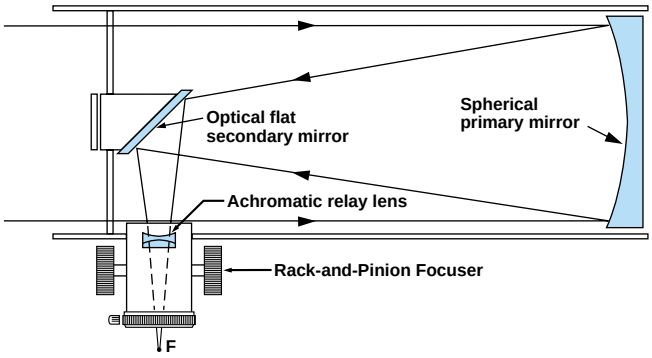
Meade NG-Series and DS-2000 Digital Series Telescopes *(left to right):* Models NG-60, NGC-60, DS-2070AT, DS-2130ATS, DS-2114ATS.

constellation Taurus, displays perhaps one hundred stars in a low-power field of the 70mm telescope, while the DS-2130ATS permits observation of over 250 stars. The larger instrument also enables, under dark-sky conditions, the resolution of faint nebulosity around some of the primary stars in the Pleiades.

Electronic Control Panel of Meade DS-2000 Digital Series Telescopes: The standard-equipment Autostar handbox plugs into the HBX port; the AUX port is used to power optional electronic accessories such as the #1240 Electric Focuser. The telescope's internal battery compartment can be seen immediately behind the control panel.

Specifications: Models NG-60 and NGC-60 Refracting Telescopes — Each supplied complete with coated, achromatic objective lens (D = 60mm, F = 700mm f/11.7), mounted in aluminum tube assembly; rack-and-pinion focuser (1.25"); NG altazimuth mount; full-length adjustable aluminum field tripod with accessory shelf; 5 x 24mm viewfinder; diagonal mirror; two eyepieces (1.25") — MA25mm, MA9mm; operating instructions. Model NGC-60 includes, in addition, manually-operated computer control system for GO TO object-location with 1400-object database and slow-motion controls on both axes.

The optical design of Meade DS-2000 Digital Series reflecting telescopes includes an achromatic relay lens, permitting longer optical focal lengths to be housed in shorter optical tubes.



Specifications: Models DS-2070AT Refracting Telescope and DS-2114ATS, DS-2130ATS Reflecting Telescopes — Each supplied complete with multi-coated, achromatic objective lens (*DS-70AT:* D = 70mm, F = 700mm f/10) or with standard aluminized primary mirror and matching elliptical flat secondary mirror (*DS-2114ATS:* D = 114mm, F = 1000mm f/8; *DS-2130ATS:* D = 127mm, F = 1000mm f/7.9); rack-and-pinion focuser with 1.25" and 2" eyepiece-holders; altazimuth mount with locks on both axes; #494 Autostar control system, with battery pack accepting eight AA-size (user-supplied) batteries, control panel, and 9-speed drives on both axes; StarNavigator™ PC-compatible astronomical software with database of over 10,000 celestial objects; full-length adjustable aluminum field tripod with accessory shelf; 5 x 24mm viewfinder (DS-2070AT) or 6 x 30mm viewfinder (DS-2114ATS, DS-2130ATS); diagonal mirror (DS-2070AT only); two eyepieces (1.25") — MA25mm, MA9mm; operating instructions.

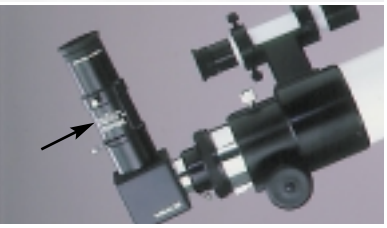
Note: Meade NG-Series and DS-2000-Series telescopes are manufactured under several Meade trade names, with variations in accessories, viewfinder, and other features among these different versions. Before purchasing, confirm with your authorized Meade dealer the accessorization and features of the Meade models carried by the dealer.

Specifications and Features: Meade NG-Series and DS-2000 Digital Series Telescopes

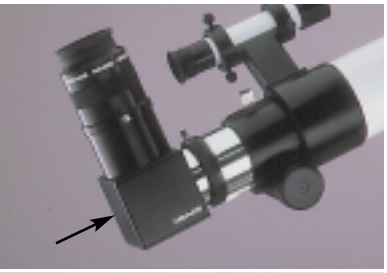
TELESCOPE MODEL:	NG-60	NGC-60	DS-2070AT	DS-2114ATS	DS-2130ATS
Optical Design	Achromatic Refractor	Achromatic Refractor	Achromatic Refractor with relay lens	Newtonian Reflector with relay lens	Newtonian Reflector
Optical Diameter	60mm (2.4")	60mm (2.4")	70mm (2.8")	114mm (4.5")	127mm (5.0 “)
Focal Length; Focal Ratio	700mm; f/11.7	700mm; f/11.7	700mm; f/10	1000mm; f/8.8	1000mm; f/7.9
Resolving Power (arc secs)	1.9	1.9	1.6	1.0	0.9
Optical Coatings	MgF_2	MgF_2	multi-coated	standard aluminum	standard aluminum
Limiting Visual Magnitude	11.0	11.0	11.3	12.4	12.6
Maximum Practical Visual Power	200X	200X	250X	325X	350X
Optical Tube Dimensions	2.5"dia. x 27"	2.5"dia. x 27"	3.0" dia. x 27"	5.7" dia. x 18"	6.4" dia. x 18"
Eyepieces (1.25" dia.)	MA9mm, MA25mm	MA9mm, MA25mm	MA9mm, MA25mm	MA9mm, MA25mm	MA9mm, MA25mm
Focuser: Eyepiece Barrel Dias.	1.25"	1.25"	1.25" and 2"	1.25" and 2"	1.25" and 2"
Mounting Type	altazimuth, single-tine	altazimuth, single-tine	altazimuth, single-tine	altazimuth, single-tine	altazimuth, single-tine
Motor Drive System	—	—	DC servo motors with encoders, both axes, 12v DC	DC servo motors with encoders, both axes, 12v DC	DC servo motors wit encoders, both axes, 12v DC
Slow-Motion Controls	No	manual, both axes	electric, 9-speed, both axes	electric, 9-speed, both axes	electric, 9-speed, both axes
#494 Autostar Control System	No	No; manual GO TO system	included; 9-speed	included; 9-speed	included; 9-speed
Autostar Slew Speeds	—	—	2x sidereal to 4.5°/sec.	2x sidereal to 4.5°/sec.	2x sidereal to 4.5°/sec.
Hemispheres of Operation	—	—	North and South	North and South	North and South
Batteries (user-supplied)	—	1 x 9v.	8 x AA	8 x AA	8 x AA
Battery Life *(approx.)*	—	10 hrs.	20 hrs.	20 hrs.	20 hrs.
Viewfinder	5 x 24mm	5 x 24mm	5 x 24mm	6 x 30mm	6 x 30mm
Materials: Tube Body	aluminum	aluminum	aluminum	steel	steel
Mounting	aluminum; high-impact ABS	aluminum; high-impact ABS	aluminum; high-impact ABS	aluminum; high-impact ABS	aluminum; high-impact ABS
Tripod	aluminum; full-length; adjustable	aluminum; full-length; adjustable	aluminum; full-length; adjustable	aluminum; full-length; adjustable	aluminum; full-length; adjustable
Total Telescope Net Weight *(lbs.)*	7	7	12	16	18
Shipping Weight *(lbs.; approx.)*	13	13	22	27	29

Optional Accessories for Meade® NG-Series and DS-2000 Digital Series™ Telescopes

Eyepieces (1.25" barrel diameter): For higher or lower magnifications, Meade 3-element Modified Achromatic eyepieces *(p. 97) and* 4-element Series 4000 Super Plössl eyepieces *(p. 94)* are excellent complements to any NG-Series or DS-2000 Series telescope model.

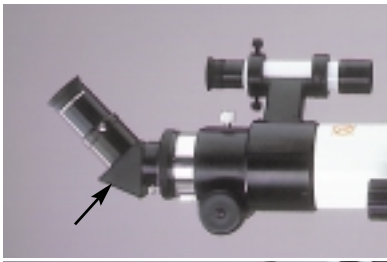


#126 2x Barlow Lens (1.25"): The #126 Barlow doubles each eyepiece power while maintaining excellent image corrections. For example, a 9mm eyepiece used with the Model DS-2070AT yields a power of 78X; when used in combination with the #126 Barlow Lens, the same eyepiece yields 156X. With Meade NG-Series and DS-Series refractors, first place the telescope's diagonal mirror into the focuser, followed by the #126 Barlow Lens and an eyepiece. With DS-2000 reflector models the #126 Barlow is placed directly into the telescope's focuser, followed by an eyepiece. *(See p. 102.)*

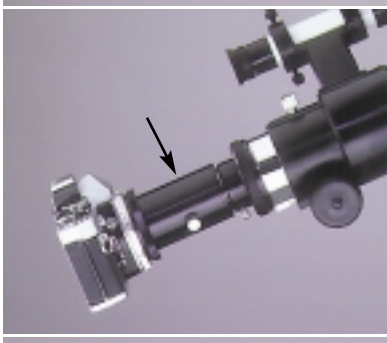


#937 2" Diagonal Mirror: Large-barrel 2" eyepieces *(e.g., MH50mm, below)* permit wide fields of view impossible to achieve with eyepieces of smaller barrel diameter. The focuser of the Meade DS-2070AT telescope includes a 2" eyepiece-holder to accept the oversize #937 Diagonal Mirror, which in turn accepts eyepieces of 2" barrel diameter. An adapter is included to allow for the use of standard 1.25"-barrel eyepieces in the 2" Diagonal Mirror as well. (Note that the #937 is required only on the DS-2070AT. DS-2000 *reflecting* telescopes (*e.g.,* DS-2114ATS) do not require a diagonal mirror for the use of 2" eyepieces.

MH50mm Wide-Field Eyepiece (2" O.D.): Ideal for spectacular low-power scanning of star fields in the Milky Way or for the study of broad diffuse nebulae, the wide-field MH50mm eyepiece is a highly desirable accessory for all DS-2000-Series telescopes. On the DS-2070AT the MH50mm ocular yields an actual field of view of 2.5° at 14X. Use with any DS-2000 telescope; on the DS-2070AT use with the #937 Diagonal Mirror.



#928 45° Erecting Prism: The 90° diagonal provided with the Meade NG-60, NGC-60, and DS-2070AT results in upright-but-reversed viewing of land subjects. The #928 45° Erecting Prism (1.25") orients the image correctly in terrestrial applications and results in a comfortable 45° viewing angle. (Not for use with Models DS-2114ATS or DS-2130ATS.)



Camera Adapter (1.25"): Meade NG-Series and DS-2000-Series telescopes may be used for through-the-telescope photography of the Moon and planets or for terrestrial objects. For eyepiece-projection photography with any of these telescopes, use the Basic Camera Adapter (1.25"). *(See also p. 103.)*

#1240 Electric Focuser: Attaches easily and quickly to any DS-2000 model for smooth, vibration-free focusing; includes coarse and microfine speeds. The hand controller accepts one (user-supplied) 9-volt battery; alternately, the focuser may be operated through the Autostar handbox.

A Word About "Power:" When buying a telescope, one of the ***least important*** factors to consider is the *power,* or magnification, of the instrument. The key to observing fine detail, whether on the surface of the Moon or on a license plate one mile in the distance, is not power, but *aperture — i.e.,* the diameter of the telescope's main (objective) lens or primary mirror. The power at which a telescope is operating is determined by the eyepiece employed; all Meade telescopes include one or more eyepieces as standard equipment, and optional eyepieces are available for higher or lower powers. Within reason power is useful, *but the most common mistake of the beginning observer is to "overpower" the telescope and to use magnifications which the telescope's aperture and typical atmospheric conditions can not reasonably support.* The result is an image which is fuzzy, ill-defined, and poorly resolved, through no fault of the telescope. Keep in mind that a smaller, lower-power, but brighter and well-resolved, image is far superior to a large, high-power, but dim and poorly-resolved, one.

How to Calculate Power: The magnification, or power, at which a telescope is operating is a function of the focal length of the telescope's main (objective) lens (or primary mirror) and the focal length of the eyepiece employed. The focal length of the objective lens is the distance between the lens and the point at which it brings light rays to a focus; this focal length (in mm) is printed on a label affixed to the optical tube of every Meade telescope. The focal length of each eyepiece (which typically ranges from 4mm to about 40mm) is printed on the upper surface of the eyepiece. To calculate power, divide the focal length of the eyepiece into the focal length of the objective lens:

$$\text{Power} = \frac{\text{focal length of objective lens}}{\text{focal length of eyepiece}}$$

Example: The Meade DS-2070AT telescope has an objective lens focal length of 700mm; when this telescope is used with a 25mm eyepiece, a power of 700 ÷ 25 = 28 power (written as "28X") results.

Choosing Your Eyepieces: Depending on how much you plan to use your telescope, and for what applications, you may wish to add 2 or 3 eyepieces and/or a multiplying "Barlow" lens, to the eyepiece(s) included as standard equipment. On any of Meade NG-Series or DS-2000 models, eyepieces of 25mm or 40mm focal length are best suited for extended star fields or nebulosities (such as the Orion Nebula, the Pleiades star cluster, or the Andromeda galaxy), or for terrestrial applications: these eyepieces result in low-powers, wide fields, and bright images. On the Moon and planets eyepieces between 4mm (high power) and 18mm (moderate power) are advised, although the highest powers should be employed only under favorable atmospheric conditions — *i.e.,* when the air is particularly steady. The Meade #126 2x Barlow Lens can be used with any of these telescopes in conjunction with an eyepiece, and results in a doubling of the power obtained when the eyepiece is used alone.